Evaluation of financial literacy of rural households: a case study of tomato farmers in Ghana

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Conflict of interest
All authors declare that they have no conflicts of interest to disclose.

Author contribution Statements
Dr. Daniel Aidoo-Mensah (Corresponding Author) contributed to the conception and design of the study, organised the database and performed the statistical analysis.

Both **Dr. Samuel Afotey Anang** and **Dr. Jack Botchway** contributed to the statistical analysis, assisted with the writing of the first draft and also contributed to manuscript revision, read, and approved the submitted version.

Abstract: Financial literacy has been described as an important a mix of knowledge, skill and attitude of individuals, households and even whole nations towards financial matters. It helps to make informed financial decisions, thereby ensuring financial stability, vis-à-vis, economic well-being of the decision maker. Globally, studies in the area of financial literacy have been conducted with the aim of measuring the level of financial literacy of respondents. The results of most of these studies have brought to the fore the poor level of financial literacy among even educated people. The present study evaluates the financial literacy of 562 tomato farmers randomly sampled from three key tomato growing regions in Ghana. Their financial literacy level was evaluated based on their opinions on five basic financial information regularly asked questions by OECD's International Network on Financial Education. To ascertain the level of agreement among the respondents in their rankings of the financial literacy items, Kendall's Coefficient of Concordance (Kendall's W) was estimated. A ranking analysis of the respondents' responses on the basic financial information indicated that "It is important that one should have a regular savings plan" was ranked as the most important information on financial literacy. Finally, by means of a binary logistic regression, the study went further to determine the tomato farmers' view on this all-important financial management tool premised on the fact that they viewed financial literacy as important to them thus availing themselves for financial literacy programmes to enhance their financial skills. The results of the binary logistic regression indicate that income diversification significantly influenced a farmer's view of financial literacy being important whilst farm size and years of education had negative but significant relationship on their view. The study has therefore confirmed the lack of interest of financial literacy among rural households particularly due to their low level of education.

Keywords: Financial Literacy, Tomatoes Farmers, Kendall's Coefficient of Concordance, Ghana

Introduction

Much as advancement in technology coupled with liberalization of financial markets all over the world have made financial products and services more available to many households, it is still believed that majority of the population particularly rural households remain excluded from mainstream financial services. This unfortunate scenario has been attributed in part to lack of adequate knowledge in financial matters as most rural households are not exposed to issues relating to financial literacy. Even in many advanced economies with well-developed financial markets, issues relating to financial literacy have been found to be generally low (Lusardi, 2019).

Financial literacy can broadly be defined as the capacity to have familiarity with and understanding of financial market products, especially rewards and risks inherent in these markets in order to make informed decisions (Servon & Kaestner, 2008; Huston, 2010). Financial literacy has assumed greater importance because financial markets have become increasingly complex and the common man finds it very difficult to make informed decisions with enough education (Ramachandran, 2011). According to Niculescu-Aron (2012), the objective of test of financial literacy among low income households and individuals is to increase knowledge levels by imparting skills and attitudes that can bring about changes in money management behaviours. It is also a tool of financial inclusion, enabling people to take greater advantage of the financial services available to them. Moreover, a strong link has been found to exist between financial literacy and savings as a choice of financial portfolio (Lusardi & Mitchell, 2007; Ramachandran, 2011; Niculescu-Aron, 2012).

Financial literacy has been touted as an important adjunct for promoting financial inclusion, financial development and ultimately financial stability (Ramachandran, 2011). Therefore, its link to financial development, vis-à-vis, economic growth cannot be overemphasized (Levine, 2005). For this reason, it is assumed that by making farmers financially literate, the welfare of their families would be achieved and the level of poverty rate among them might experience a downward trend. Moreover, it is imperative that prospective entrepreneurs particularly farmers need to acquire a certain level of financial skills and knowledge as a precursor to identify business opportunities, transform business ideas into opportunities as well adopt innovation and take advantage of business opportunities. A lack of these implies that most farmers may see less business opportunities thereby, operating less profitable ventures. It is therefore in this direction that most microfinance institutions have included in their lending schemes the "microfinanceplus" strategy which aims at offering trainings on financial literacy to their clients (Garcia & Lensink, 2019).

The Tomato Industry and Financial Literacy in Ghana

Tomato production is a thriving agribusiness industry in the savanna and forest-savanna transitional belts of Ghana. It provides good nutritional balance to farm families as well as boosts their income and hence standard of living. In the afore-mentioned ecological belts, the crop is grown on a large scale in such areas as Tono and Vea areas in the Upper East region; Akumadan, Kumawu and Agogo areas in the Ashanti region; Wenchi, Awisa, Yamfo, Abesim, Techiman, Ofuman, Derma and Techimantia areas in the then Brong Ahafo region

and other areas such as Akim Oda, Nsawam, Suhum, Oyoko in the Eastern region (Adu-Dapaah and Oppong-Konadu, 2002). Its production serves as a lucrative source of employment particularly for the many male youth engaged in its cultivation.

Despite the fact that the agribusiness activities associated with the tomato industry plays an enormous role in the financial and nutritional well-being of most farm families in Ghana, production of the crop has not been encouraging over the years (Adu-Dapaah and Oppong-Konadu, 2002). This has largely been attributed to the failure of the crop to reach its potential in terms of attaining yields comparable to other countries, its inability to sustain processing plants and also its inability in improving the livelihoods of households involved in tomato production and the tomato commodity chain (Robinson and Kolavalli, 2010). It is therefore not surprising that Ghana continues to import several tonnes of tomato and tomato products into the country and the nation has been observed to be second only to Germany as the largest importer of tomato paste, consuming an average of twenty five thousand (25,000) tonnes of tomato paste in a year at a total cost of about $25 million dollars (Yeboah, 2011).

The focus of efforts by various stakeholders in the tomato industry in Ghana geared towards finding solutions to the myriads of problems associated with tomato production has mostly been looked from the agronomic perspective. However, there is no gainsaying of the fact that tomato farmers' quest for survival now and into the future in today's ever-changing and challenging environment of economic development hinges not only on agronomic issues but also on their ability to sustain their production activities through their earnings (Aidoo-Mensah, 2018).

This is the reason why that rural households in general, self-finance their economic activities basically from their earnings. Of particular importance is the fact that such earnings are needed to adopt improved technologies in order to maintain or increase their production (Obwona and Ddumba-Ssentamu, 1996; Bautista and Lamberte, 1990). Therefore, a better understanding of the complex financial environment in which they operate through improved financial literacy might contribute to a better understanding of the financial decision-making process of such farmers. This according to Hayden, *et al.*, (2021) might contribute to potential improvement in farm financial management, vis-à-vis, sustainable farm enterprises. In order to achieve this objective, financial literacy of tomato farmers is explored to help financial intermediation practitioners design appropriate financial products to meet the special needs of these farmers.

Methodology

A basic assessment was conducted to examine at the collective level the financial literacy of the respondents by means of a 5-response scale – (Strongly Agree; Agree; Neutral; Disagree; Strongly disagree). This was done to test the respondents' knowledge on some basic financial information. The basic financial information employed is based on regularly asked questions from OECD's International Network on Financial Education (2011). The basic information was made of the following: ***It is important for one to have a budget before making any expenditure; It is needful that before one buys anything one carefully considers whether***

one can afford it and actually needs it; It is important that one lives for today and let tomorrow take care of itself; One can conveniently save his/her money in a secure place at home and *It is important that one should have a regular savings plan*.

To ascertain the level of agreement among the respondents in their rankings of the financial literacy items, the Kendall's Coefficient of Concordance (Kendall's W) was estimated. The Kendall's Coefficient of Concordance (*W*) is used to test the level of agreement in ranking a set of issues of interest among different judges, in this case the tomato farmers (Legendre, 2005). The essence of this computation was to ascertain whether or not there is agreement among the farmers in their rankings of the different financial literacy items.

The Kendall's coefficient of concordance (*W*) is a measure of the degree of agreement or disagreement among *m* raters ranking *k* subjects in rank from 1 to *k*. *W* is defined as:

$$W = -\frac{12R}{m^2(k^3 - k)}$$

Where $0 \leq W \leq 1$

The following is applied: r_{ij} = the rating a rater *j* gives to a subject *i*. For each subject *i*, R_i is given as:

$$R_i = \sum_{j=1}^{m} r_{ij}$$

Where $\bar{R}$ is mean of R_i and R is the squared deviation of R_i from $\bar{R}$ and which is given as:

$$R = \sum_{i=1}^{k} (R_i - \bar{R})^2$$

The mean of R_i can be expressed as:

$$\bar{R} = \frac{1}{k} \sum_{i=1}^{k} R_i$$

Where R_i is given as:

$$R_i = \frac{1}{k} \sum_{i=1}^{k} \sum_{j=1}^{m} r_{ij}$$

And r_{ij} is also given as:

$$r_{ij} = \frac{1}{k} \sum_{j=1}^{m} \frac{k(k+1)}{2} = \frac{m(k+1)}{2}$$

For each rater j:

$$\sum_{i=1}^{k} r_{ij} = 1 + 2 + \cdots \ldots \ldots \ldots + k = \frac{k(k+1)}{2}$$

If all the R_i are the same (i.e. the raters are in complete disagreement), then $W = 0$.
The following hypothesis was tested for the constraints as follows:

H_0: There is no agreement among the tomato farmers on their level of knowledge on the basic information on financial literacy

H_1: There is agreement among the tomato farmers on their level of knowledge on the basic information on financial literacy

The coefficient of concordance W was tested for significance using the F-distribution.

Sampling Technique
The sample for the study was selected in three (3) stages; first was the purposive selection of regions – Ashanti, Brong Ahafo and Upper East regions. The selection of the 3 regions was guided by the level of agricultural activities, consideration of the objectives of the study as well as time and resources available at the disposal of the researchers. Moreover, the selection of the 3 regions and their respective districts took into consideration the volume of tomato production based on official statistics from Ministry of Food and Agriculture (MoFA). For instance the records of PPMED of MoFA (1997) indicate that the Ashanti and the Brong Ahafo regions together contribute 43 per cent of the total tomato produced in the country. The selection of regions was followed by the purposive selection of two districts in each of the three regions.

The third stage of the sampling involved identifying and listing on paper, all tomato farmers in the various operational areas. This was undertaken with the help of Agricultural Extension Agents (AEAs) in charge of the operational areas in each of the selected districts. An operational area is a spatial unit canvassed by one agricultural extension agent. The designation of the limit of the operational area is based on the fact that the operational area forms the building block of a district and it does not cut across the boundary of any other administrative districts.

To ensure random selection of respondents, each farmer on the list prepared had his/her name on a piece of paper and folded properly. The folded papers containing the names were then mixed thoroughly in a bowl. The folded papers were picked randomly one at a time from the bowl.

The total number of respondents for the study was determined using an estimation method based on Bartlett *et al*., (2001) as below:

$$n = \frac{Z^2(p)(q)}{(E)^2}$$

Where

n = Sample size

p= the proportion of people who access financial services/those who have bank account

q= the proportion of people who do not have to access financial services/those who do not have bank account

Z = Number of standard deviations for a chosen confidence interval level

E = The allowable margin of error

According to GLSS (5) report about 42% of individuals living in rural areas have access to financial services (savings account) (GSS, 2008). Thus, assuming 95% confidence level and 5% margin of error:

$$n = \frac{1.96^2 \text{ x } 0.42 \text{ x } 0.58}{0.05^2} = 374$$

This implies n=374. However, in order to capture the diversity of the selected regions on a more magnified scale, thereby, ensuring fair distribution of the respondents within the selected districts, as well as improving the reliability and validity of the results, the sample was increased by 60%. Thus, the total sample size is approximated to 598; this was proportionally distributed across the districts based on the number of households engaged in agricultural production obtained from the 2010 Population and Housing Census. However, the response rate was 94%, that is, 562 out of the 598 were fit for the analyses.

Results and Discussions
Gender
It is generally agreed upon that both women and men need to be sufficiently financially literate to effectively participate in economic activities and take appropriate financial decisions for themselves and their families. Nevertheless, women often have less financial knowledge and lower access to formal financial products than men, an issue which tends to reflect negatively in their participation in most economic activities (INFE, 2013). It is therefore not surprising that the results on Table 1 indicate that tomato production in the three regions is dominated by males (80.1%).

Table 1: Demographic characteristics of respondents

Variable	Ashanti Region (N=134)		Bono and Ahafo Regions (Brong Ahafo) (N=237)		Upper East Region (N=191)		All households (N=562)	
	N	%	N	%	N	%	N	%
Gender of Respondents								
Male	98	73.1	204	86.1	148	77.5	450	80.1
Female	36	26.9	33	13.9	43	22.5	112	19.9
Age Category								
< 30	13	10	63	27	28	15	104	19
30-65	114	85	161	68	162	85	437	78
> 65	7	5	13	5	1	1	21	4
Highest level of formal education								
None	30	22.4	39	16.5	73	38.2	142	25.3
Primary	26	19.4	27	11.4	74	38.7	127	22.6
MSLC	41	30.6	75	31.6	1	0.5	117	20.8
Secondary	34	25.4	34	39.2	42	22.0	169	30.1
Certificate	2	1.5	1	0.4	0	0.0	3	0.5
Diploma	0	0.0	2	0.8	0	0.0	2	0.4
Graduate	1	0.7	0	0.0	1	0.5	2	0.4
Marital Status								
Single	18	13.4	49	20.7	24	12.6	91	16.7
Married	116	86.6	188	79.3	167	87.4	471	83.3
Number of years of experience in tomato farming								
<= 5	33	24.6	56	23.7	36	18.9	125	22.2
6-25	80	59.7	156	67.8	149	78.0	385	68.5
26-45	21	15.7	24	10.1	6	3.1	51	9.1
> 45	0	0.0	1	0.4	0	0.0	1	0.2
Household Size								
<= 3	24	17.9	74	31.2	16	8.4	114	20.3
4-6	76	56.7	87	36.7	127	66.5	290	51.6
7-9	26	19.4	60	25.3	42	22.0	128	22.8
> 9	8	6.0	16	6.8	6	3.1	30	5.3
Age of dependents								
< 15	276	50.4	383	32.1	368	38.1	1027	38.0
15-65	268	48.9	763	64.0	572	59.3	1603	59.2
> 65	4	0.7	46	3.9	5	2.6	75	2.8
Total	548		1192		965		2705	
Dependency Ratio		*104.5*		*56.3*		*68.6*		*68.9*

Source: Field Survey, 2021

Moreover, it has been argued that given the fact that women have very limited experience in the market economy, they tend to be extremely cautious in their selection of business ventures in order to avoid possible business failures (Sharma & Zeller, 2000). However, it is important that financial literacy needs of women are well addressed since women are more likely than men to take primary responsibility for childrearing, to take important decisions on

daily basis about the allocation of household resources, and to have a major role in the transmission of financial habits and skills to their children. Hence, they need to have adequate financial skills not only for themselves but also for future generations (INFE, 2013).

Age

Though, it has been established that more elderly individuals tend to perform better in financial literacy "tests" than younger ones (Suhail, *et al.*, 2021), however, studies in cognitive aging show that older respondents experience a decline in cognitive processes closely related to financial decision making and that financial literacy scores decline by about 2% each year after age 60, and the rate of decline does not increase with advanced age (Finke *et al*, 2016). There is therefore compelling evidence that there is potential for enhanced financial literacy programmes to target the farmers in the tomato sector in Ghana since majority of these respondents are in their relatively youthful ages (39.90 years; SD=10.96) and may be ready to learn financial intricacies aimed at helping them improve their lot.

Educational Level

Education has been described as the process of acquiring knowledge, values, skills and attitudes in order to enable an individual develop his/her capacities for general well-being. It is, thus, deemed an important tool for a nation's socio-economic development since it has been established that there is a connection between education and economic growth (United Nations Development Programme, 2011). Education is therefore, regarded as an important determinant of financial literacy as it equips one with the required knowledge in the discretional use of one's income (Donkoh, Tachega & Amowine, 2013), thereby positively influencing one's ability to accumulate assets (Avery & Kennickell, 1991; Attanasio, 1993; Browning & Lusardi, 1996).

The results of the distribution of the respondents in terms of their level of education as shown on Table 1 indicate that the Upper East Region has the highest level of respondents with no formal level of education (38.2%) as compared to 22.4% in the Ashanti Region and 16.5% in the Brong Ahafo Region. The gap in the educational attainment between the Upper East Region and the country as a whole is still very wide. The relatively low level of education in the region has been attributed not only to general poverty and cultural practices but also to the very late introduction of education into the region (GSS, 2013) and this is more likely to have a negative effect on their financial literacy, vis-à-vis, their income levels (Aidoo-Mensah, 2017).

Marital Status

Research indicates that marriage has a large effect on reducing the risk of poverty and is associated with a higher probability of attaining affluence over the life course when compared with non-marriage. Compared to married couples, unmarried people have also been found to save much lower portions of their income and accumulate fewer assets, perhaps due to better financial management an important outcome of financial literacy, on the part of married couples (Grinstein-Weiss, Zhan and Sherraden, 2004).

As indicated on Table 1, 83.3% of all the respondents were married. Marital status across the three regions of the study indicates that over 70% of the respondents are married in each region. It is most likely that majority of the farmers are married in order to get extra hands to assist them in their farm operations.

A ranking analysis of the respondents' responses on the basic financial information indicated that "**It is important that one should have a regular savings plan**" was ranked as the most important information on financial literacy as seen on Table 3. A savings plan has variously been described as an important mechanism that helps individuals/households overcome the challenge of lack of self-control associated with the decision to save (Ashraf *et al.*, 2003). Therefore, by means of effective savings plan individuals/households may be committed to the habit of saving a fixed amount of money on regular basis in order to reach a financial goal on a short or long-term basis. Moreover, saving money as envisaged by drawing effective savings plan is deemed as one of the essential aspects of building wealth and having a secure future as it can help one to steer out of many financial hurdles and obstacles in life.

"**It is important for one to have a budget before making any expenditure**" was ranked as the second most important information on financial literacy as depicted on Table 3. Information on financial budgeting has been described as a systematic process by means of which households/individuals prioritize their financial goals in order to properly allocate their financial resources to cover both their consumption and investment needs. By drawing a budget before expenditure, one can avoid spending more than one earns. It has been observed that without this all important financial tool, and relying on poor approximations to take financial decisions, the outcome has in most cases been disastrous with households going into debts, thereby depriving them of their savings (Ramachandran, 2011).

"**It is needful that before one buys anything one carefully considers whether one can afford it and actually needs it**" was ranked as the third most important information on financial literacy as seen on Table 3. According to studies on money management, one important aspect of money management behaviour is to avoid going into debt which in most cases deprives households and individuals the opportunity to save. In order to avoid this, it is often suggested that households and individuals stay within their "network of social relations" which both influences and dictates their consumption choices (Cowan, 1987; Rea, n.d.) based on the importance of the consumption item, that is, its utility as well as its affordability. Moreover, this statement on financial literacy brings to the fore the necessity to overcome impulsive buying which is occasioned by the acquisition of an item through a mere sight of it, without one taking time to reflect on whether s/he really needs it.

Table 2: Distribution of Respondents' Yes and No Responses Financial Literacy Test Items

BASIC FINANCIAL INFORMATION	MEAN SCORE (STANDARD DEVIATION)	N	%YES RESPONSE	%NO RESPONSE

Regular savings plan	0.765125 (0.424299)	562	**77**	**23**
Budget before making any expenditure	0.704626 (0.456617)	562	**70**	**30**
Careful consideration before spending	0.994662 (0.072932)	562	**99**	**1**
Saving at home	0.012456 (0.111006)	562	**1**	**99**
Living for today	0.154804 (0.36204)	562	**15**	**85**

Source: Field Survey, 2021

"**One can conveniently save his/her money in a secure place at home**" was ranked as the fourth item and this is not surprising with such ranking as only 9 (1%) of the respondents indicated by saying YES, that is, it is important that one conveniently saves his/her money in secure place at home.

Rural households by the nature of their dominant income generating activities and agriculture, may find themselves relatively far away from the premises of financial service providers. In such a situation it is assumed that a rural household's choice to acquire a saving deposit instrument is likely to be influenced by the proximity of the financial service provider to the household's locality (Rutherford, 1999; Kiiza & Pederson, 2002; Bendig *et al*., 2009; Mbuthia, 2011). This need of proximity to the service provider is deemed necessary as means of cutting down transaction costs which have been defined as the amount of expenditures incurred by households in making and withdrawing deposit (Rodriguez & Meyer, 1988). The most convenient means of cutting down transaction costs and also ensuring quick and easy access to one's savings for most rural households is for them to save their money in a secure place at home.

However, the actual implementation of such mode of savings may be fraught with many limitations which at the end may outweigh the benefits of saving one's money in a secure place at home. Prominent among these limitations of saving one's money in a secure place at home is the fact that such saved money can easily be stolen, destroyed by fire or some natural disaster, its value may decrease over time with inflation as well as not earning any value in terms of interest. Moreover, such money can easily be spent or wasted on unnecessary items.

"**It is important that one lives for today and let tomorrow take care of itself**" was ranked as the least important information on financial literacy as seen on Table 3, although 87 (15%) of the respondents indicated by saying YES, that is, it is important that one it is important that one lives for today and let tomorrow take care of itself as seen on Table 2.

It has been observed that in the event of decision making particularly during an uncertain threatening situation such as a health crisis or a pandemic, the primitive part of the human brain usually becomes more prominent, pushing individuals to engage in behaviours that are perceived as necessary for their survival (Refs) and to engage in acts of instant gratification. However, once individuals are not facing life-threatening challenges, issues bordering on instant gratification are related to the background in favour of more pressing issues of future value. It is therefore not surprising that the respondents who were actively involved in their agricultural production activities at the time of the study put enormous weight not on the present but on the future, thereby, drastically discounting present events (Laibson, 2007), thus, ranking the financial literacy item as the least important.

Table 3: Distribution of respondents' knowledge on some basic financial information

BASIC FINANCIAL INFORMATION	MEAN	RANK
It is important that one should have a regular savings plan	4.758007	1
It is important for one to have a budget before making any expenditure	3.850534	2
It is needful that before one buys anything one carefully considers whether one can afford it and actually needs it	3.384342	3
One can conveniently save his/her money in a secure place at home	1.852313	4
It important that one lives for today and let tomorrow take care of itself	1.156584	5
Number of observations (N)		562
Kendall's W		0.86770836
Chi-square		1950.6084
Df.		4
Asymptotic significance		0.0000

Source: Field Survey, 2021

Degree of association among respondents on their financial literacy on savings
In order to examine the degree of agreement among the respondents on their level of knowledge on the basic financial information on savings, the Kendall's coefficient of concordance was employed. Kendall's W-value of 0.86770836 as seen on Table 3 indicates there is about 87% agreement between the respondents in ranking the 5 items underlining financial literacy and therefore the null hypothesis that there is no agreement among the ratings is rejected at any reasonable level of significance (p<0.01).

Since financial literacy has been touted as an important tool to improve upon ones money management skills, the study went further to determine the tomato farmers' view on this all-important financial management tool. This became necessary in order to find out from them taking into consideration the labour intensive nature of tomato cultivation, if they will be to avail themselves for financial literacy programmes to enhance their financial skills, premised on the fact that they viewed financial literacy as important to them.

Distribution of respondents' view on Financial Literacy

As seen on Table 4, majority of the respondents (88%) indicated that their view on financial literacy is important and are willing to avail themselves for any training programme on it.

Table 4: Distribution of respondents' view on Financial Literacy

Views on Financial Literacy	N	%
Financial literacy is important	496	88
Financial literacy is not important	66	12
Total	**562**	**100**

Source: Field Survey, 2021

In the determination of the theoretical model of respondents' view on the importance of financial literacy, the study made use of the probability choice models used by Maddala (1999), Kiiza and Pederson (2002) and Mbuthia, (2011) with the necessary modifications as informed by the general utility theory. Thus, the utility function of a tomato farmer who is faced with the choice between viewing financial literacy as important or not important is given as:

$$U_{ij} = U_{ij}(X_{ij}) \tag{1}$$

Where:

U_{ij}= Utility of the ith tomato farmer whose view, jth, of financial literacy may be positive (important) or negative (not important)

X_{ij}= Vector of characteristics (socio-economic and demographic) of the ith tomato farmer who expresses jth view on financial literacy

Equation (1) can be specified as:

$$U_{ij} = X_{ij}\beta + \varepsilon_i \tag{2}$$

Where β is a vector of coefficients to be estimated and this underscores the socio-economic and demographic characteristic of the tomato farmer.

ε_i represents the error term which is assumed to be randomly distributed as well as independently and identically distributed.

Supposing a tomato farmer chooses either formal or informal mode of savings resulting in a binary dependent variable, Y_i which is estimated by using logistic distribution such that Y_i takes a value of either 1 or 0 and y_i being the realisation of Y_i which is defined as:

$$y_i = \begin{cases} 1 \; if \; a \; tomato \; farmer \; views \; financial \; literacy \; as \; important \\ 0 \; if \; s/he \; views \; financial \; literacy \; as \; not \; important \end{cases} \tag{3}$$

The probabilities of viewing financial literacy as important or not important can take probability values of π and π-1 respectively. It implies that if:

$$y_i = 1, that\ is\ financial\ literacy\ is\ important, we\ obtain\ \pi \qquad (4)$$

And if:

$$y_i = 0, that\ is\ financial\ literacy\ is\ not\ important, we\ obtain\ 1 - \pi \qquad (5)$$

For the ith tomato farmer, the utility of viewing financial literacy as important is given as U_{ij}. Whilst the utility of choosing informal mode of savings is given by U_{ij}'. The two scenarios are expressed as:

$$U_{ij} = X_{ij}\beta + \varepsilon_i \quad (Option\ 1)$$

$$U_{ij}' = X_{ij}'\beta' + \varepsilon_i' \quad (Option\ 2)$$

Where X_{ij} and X_{ij}' are the vectors of the characteristics of the parameters, β and β' respectively.

Assuming that the utilities U_{ij} and U_{ij}' are randomly distributed such that the ith individual chooses the Option 1, thus $U_{ij} > U_{ij}'$, is given as:

$$X_{ij}\beta + \varepsilon_i > X_{ij}'\beta' + \varepsilon_i' \qquad (6)$$

By equating β to $(\beta - \beta')$, Equation (6) can be re-arranged and re-written as:

$$\varepsilon_i' - \varepsilon_i < X_{ij}\beta \qquad (7)$$

It is also assumed that the two error terms, ε_i and ε_i' are independently and identically distributed and are drawn from a Log-Weibull distribution such that the probability of a respondent choosing for instance Option 1 is given by the cumulative density of the difference between the two $\varepsilon_i' - \varepsilon_i$ to the point $X_{ij}\beta$. The probabilities of the two options are modelled by the distribution function (cumulative probability function) of the logistic distribution given as:

$$\Pi_i = \frac{exp\{X_i\beta\}}{[1 + exp\{X_i\beta\}]} \qquad (8)$$

As in Mbuthia (2011), the logistic function is estimated using maximum likelihood method to ensure that heteroscedasticity inherent in the model is solved. The maximum likelihood function (L) corresponding to Equation (8) is given as:

$$L = Ln\left(\frac{\Pi_i}{1 - \Pi_i}\right) = \left(\frac{e^{X_{ij}'\beta}}{1 + e^{X_{ij}'\beta}}\right) \div \left(1 - \frac{e^{X_{ij}'\beta}}{1 + e^{X_{ij}'\beta}}\right) = Ln\left(e^{X_{ij}'\beta}\right) = X_{ij}'\beta \qquad (9)$$

X is row vector of the demographic and socio-economic characteristics of the tomato famer who views financial literacy as important or not important. β represents a column vector of coefficients characterizing the choice between formal and informal mode of savings.

Specification of empirical model
From Equation 9, the empirical model of a tomato farmer's view on financial literacy is given as:

$$FL = X_{ij}{}'\beta + \varepsilon_i \tag{10}$$

The variables characterising the decision of viewing financial literacy as important or not were identified from literature, thus, the empirical model is given as:

$$FL = \beta_0 + \beta_1(Agefmr) + \beta_2(Farmsz) + \beta_3(Incomdiv) + \beta_4(Yrsedu) + \varepsilon_i \tag{11}$$

Definition and measurement of variables and their underlying hypothesis
Agefmr – The likelihood of being overconfident with one's financial knowledge increases with age (Finke *et al*, 2016). It is therefore hypothesized that as one ages one is more likely to view financial literacy as important.
Farmsz – Farm size in some instances has been used as proxy for wealth and in this direction it is hypothesized that as farm size increases, one's wealth may be increasing and as such one may probably see financial literacy as an important tool to help diversify his/her assets in a more meaningful way
Incomdiv – Income diversification is a dummy variable given as one (1) if a tomato farmer engaged in non-farm income generating activity and zero (0) if otherwise. It was expected that all things being equal, engagement in non-farm activity was likely to be influenced by a farmer's perception of regarding financial literacy as important.
Yrsedn – Years of education indicate the number of years a tomato farmer has had formal education. It is hypothesized that as the number of years of education of a tomato farmer increase to the level of secondary education and above, it is expected that, that farmer would have higher probability of viewing financial literacy as important

Empirical Analysis of factors influencing the view of financial literacy as important or not important
In order to investigate the determinants underlying the respondents' view of seeing financial literacy as important or not a binary logistic regression analysis was done with the results as reported on Table 5. The binary regression analysis is based on four predictor variables in an empirical model specified below:

$$FL = \beta_0 + \beta_1(Agefmr) + \beta_2(Farmsz) + \beta_3(Incomdiv) + \beta_4(Yrsedu) + \varepsilon_i$$

Where the dependent variable is financial literacy (FL) which is a dummy that takes a value of 1 when a farmer views financial literacy as important and a value of 0 when a farmer views financial literacy as not important.

The predictor variables are age of farmers, farm size, income diversification and years of education. A test of the full model versus a model with intercept only was statistically significant at $\chi^2(4, N=562) = 29.673$, $p < .000$. Though, the model explained 10.0%

(Nagelkerke R^2) of the variance in farmer's view of financial literacy being important or not, it correctly classified 88.2% of the views.

Table 5: Binary Logistic Function Results for Financial Literacy is important (N=562)

Variables	Coefficient (B)	S.E.	Wald	Df	P-value	Odds Ratio Exp(B)
Age of respondents	-.019	.013	2.192	1	.139	.981
Farm size	-.715	.255	7.867	1	.005***	.489
Income diversification (1=YES)	.601	.273	4.833	1	.028**	1.824
Years of education	-.071	.029	6.049	1	.014**	.931
Constant	-.872	.719	1.473	1	.225	.418
Financial literacy is important (reference) 1						

Source: Field Survey, 2021 ***significant at 1%, **significant at 5%, *significant at 10%

Association between Farm Size, Income Diversification and Farmers' Perception on Financial Literacy

The results from Table 5 indicate a significant but negative relationship between farm size and a farmer's view of financial literacy being important. This may suggest that in viewing financial literacy as important and in order to have enough time to enable one to avail him/herself for any training programme on financial literacy, a tomato farmer may reduce farm size.

In order to fully understand the import of such a decision, consideration is made of the odds of a tomato farmer who engages in non-farm income generating activities as means of income diversification and also views financial literacy as important which is 1.824 times greater than one who engages in non-farm income generating activities but views financial literacy as not important.

In essence, it may mean that in order for a farmer to avail him/herself for any training programme on financial literacy, such a farmer has to reduce his/her tomato farm size, so as to have enough time to engage in non-farm income generating activities to compensate for the reduction in tomato farm size, vis-à-vis, make up for the loss in tomato income as result of the reduction in tomato farm size. This sounds plausible since engagement in non-farm activities is deemed as an important component of income diversification which enables practitioners to seek business or employment opportunities other than traditional crop production and livestock rearing (Kim, 2011). This has been necessary particularly for tomato farmers in Ghana since the sector's performance in terms of sustaining and improving the livelihoods of practitioners keeps on declining (Robinson & Kolavalli, 2010) mainly due to the volatility of tomato prices in recent times (Tutu, 2010). Thus, income diversification for the tomato farmers becomes a significant livelihood strategy which may enable these farmers

to improve upon their income inflows in the face of declining fortunes of the tomato sector as well as improving their financial management skills through financial literacy programmes. Moreover, the decline in the profitability of the tomato industry tends to demotivate the farmers who may not see tomato farming as lucrative market-oriented activity to warrant seeking financial knowledge and services.

Association between Years of Education and Farmers' Perception on Financial Literacy

Table 5 also indicates a significant but negative relationship between years of education and a farmer's view of financial literacy as important this is not consistent with *a priori* expectation. This suggests that low levels of education has the tendency of beclouding ones sense of viewing financial literacy as essential skill necessary to help an individual to take responsibility for their financial security and this is not surprising as financial literacy levels have been found to be low among people with low level of education (Wagner, 2019). This according to Lusardi (2019) has resulted in cases of ineffective spending and financial planning, and expensive borrowing and poor debt management particularly among such group of people. In a nutshell, it implies that farmers with relatively low levels of education are more likely not to appreciate financial literacy and the knowledge that comes with it.

Conclusions and Recommendations

The study sought to evaluate financial literacy among tomato farmers in three well-known tomato cultivating regions in Ghana. The study has confirmed the lack of interest of financial literacy among rural households particularly due to their low level of education. In spite of this shortfall among rural households, they still see financial savings as important as aspect of their lives. It is therefore recommended that efforts should be made by the government for more funds allocation not only for formal education – primary, secondary and tertiary levels but also for adult education programmes which is hoped will increase financial literacy levels among the adult population. Moreover, education of farmers particularly by extension agents should aim at expanding the horizon of farmers on the importance of financial savings. These considerations, it is envisaged would ensure that adults particularly those in the rural areas take informed decisions on savings.

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